FIG. 1

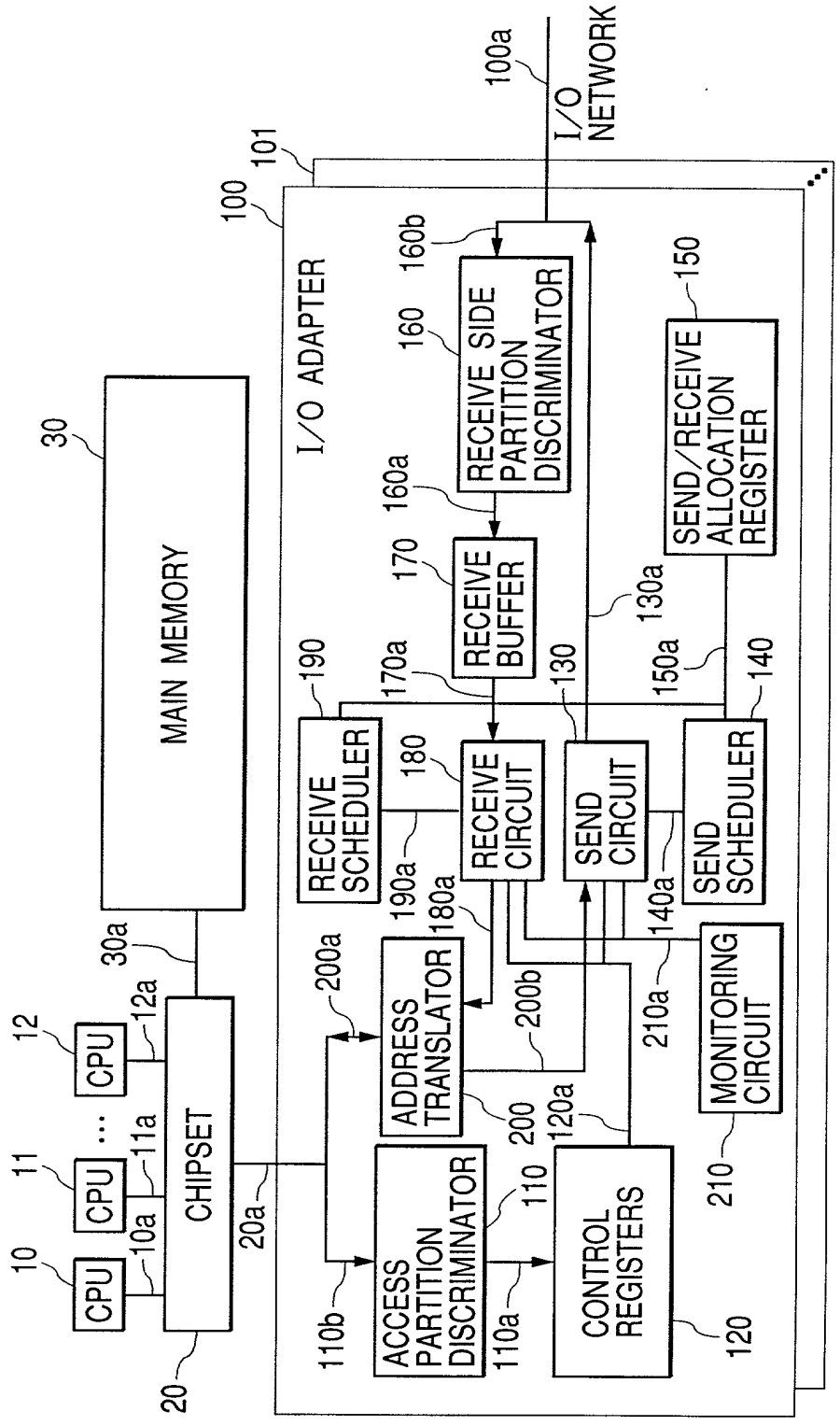
I/O NETWORK
100a
101
100
I/O ADAPTER
160b
160
RECEIVE SIDE PARTITION DISCRIMINATOR
150
SEND/RECEIVE ALLOCATION REGISTER
160a
170
RECEIVE BUFFER
130a
150a
140
190
170a
130
RECEIVE SCHEDULER
180
RECEIVE CIRCUIT
SEND CIRCUIT
SEND SCHEDULER
190a
180a
140a
30
MAIN MEMORY
30a
200a
200b
210a
MONITORING CIRCUIT
12
12a
CPU
ADDRESS TRANSLATOR
200
120a
11
11a
CPU
110
210
10
10a
CPU
CHIPSET
20a
ACCESS PARTITION DISCRIMINATOR
CONTROL REGISTERS
110b
110a
120
20

FIG. 2A

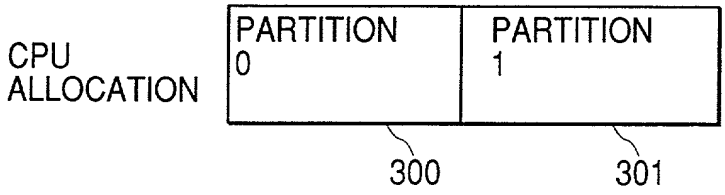

FIG. 2B

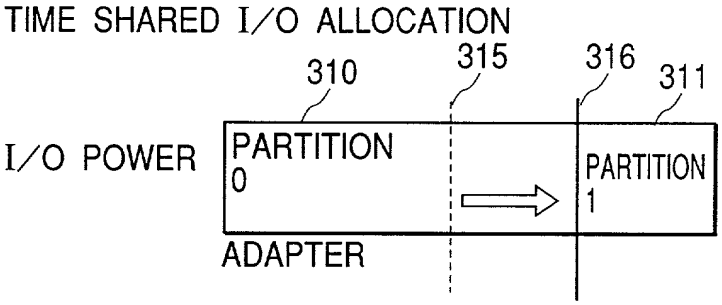

FIG. 2C

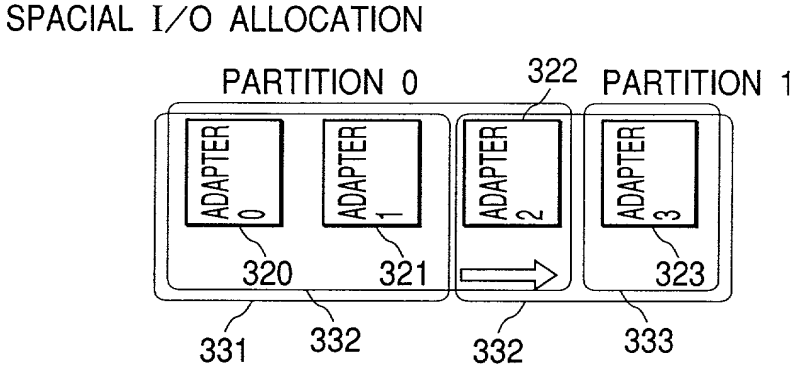

FIG. 3

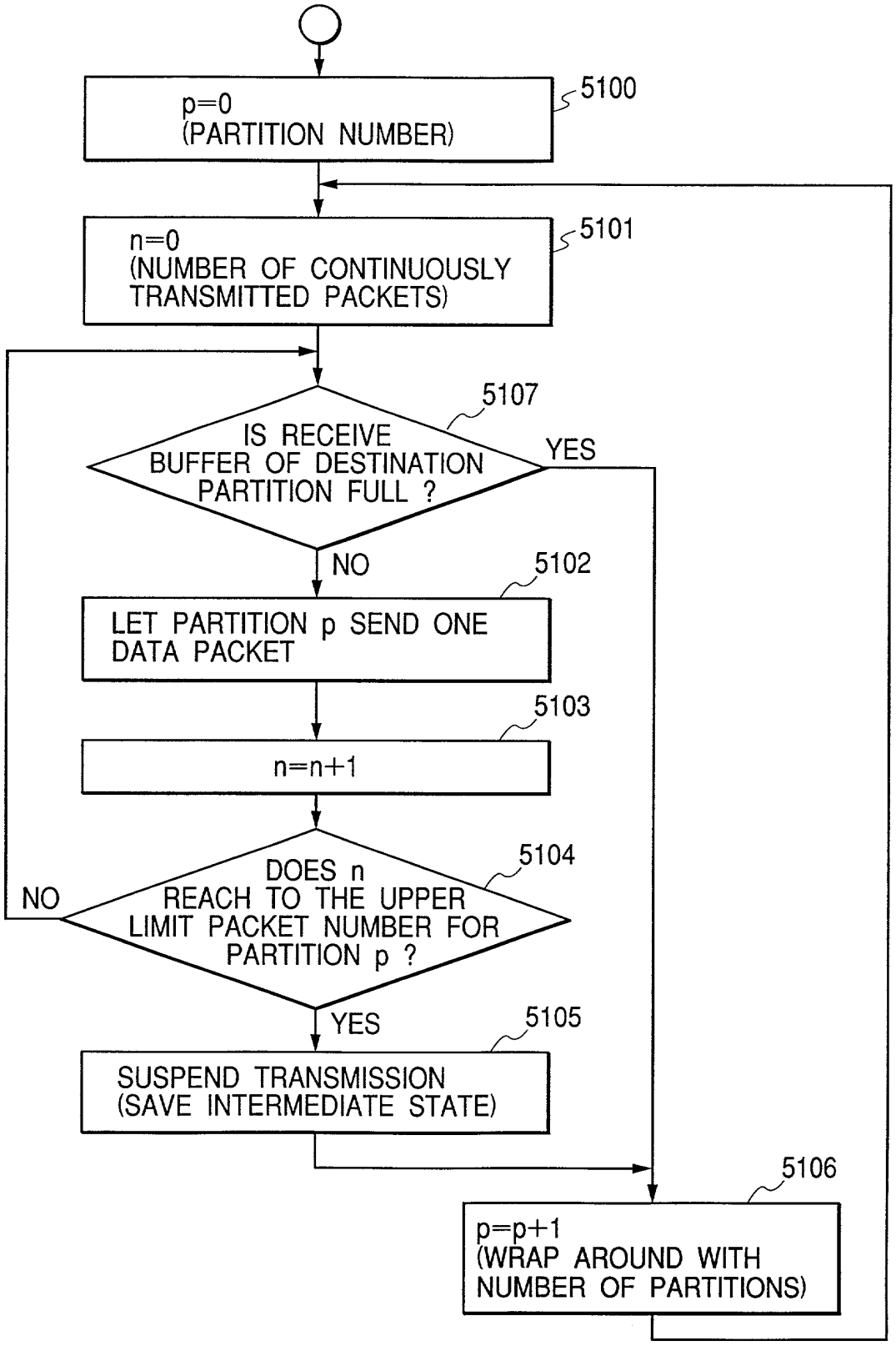
p=0
(PARTITION NUMBER)
5100
n=0
(NUMBER OF CONTINUOUSLY TRANSMITTED PACKETS)
5101
IS RECEIVE BUFFER OF DESTINATION PARTITION FULL ?
5107
YES
NO
LET PARTITION p SEND ONE DATA PACKET
5102
n=n+1
5103
DOES n REACH TO THE UPPER LIMIT PACKET NUMBER FOR PARTITION p ?
5104
NO
YES
SUSPEND TRANSMISSION (SAVE INTERMEDIATE STATE)
5105
p=p+1
(WRAP AROUND WITH NUMBER OF PARTITIONS)
5106

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FIG. 4

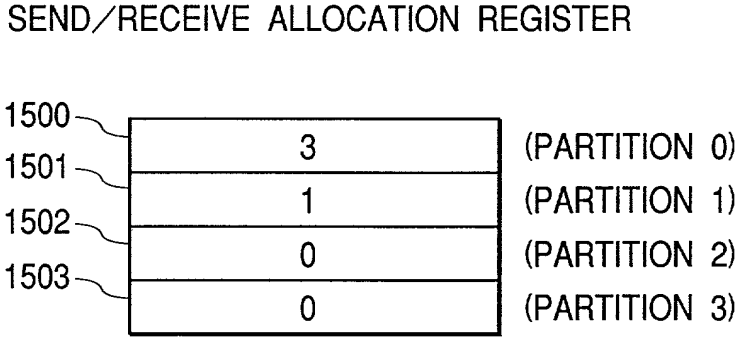


FIG. 5

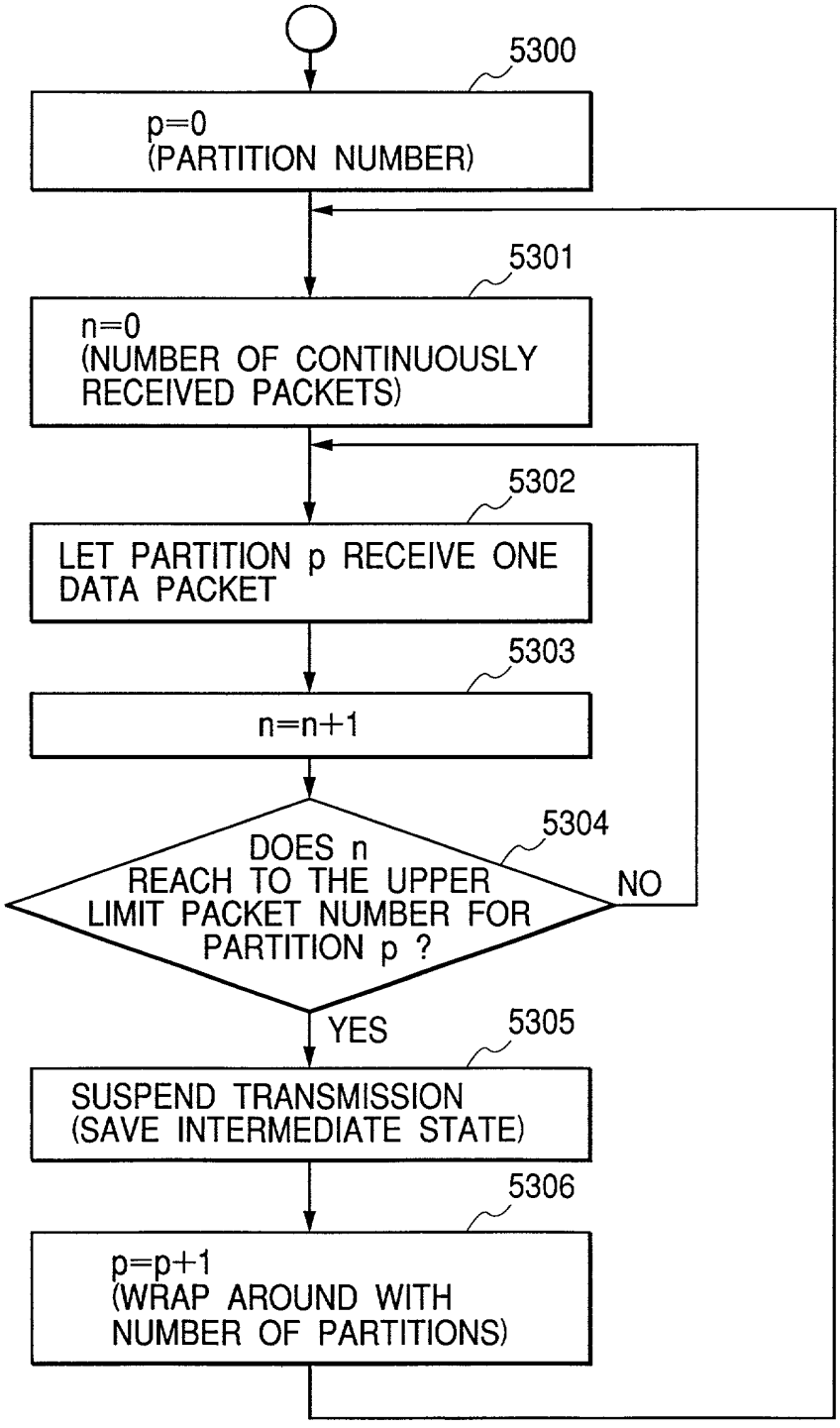

5300
p=0
(PARTITION NUMBER)
5301
n=0
(NUMBER OF CONTINUOUSLY RECEIVED PACKETS)
5302
LET PARTITION p RECEIVE ONE DATA PACKET
5303
n=n+1
5304
DOES n REACH TO THE UPPER LIMIT PACKET NUMBER FOR PARTITION p ?
NO
YES
5305
SUSPEND TRANSMISSION (SAVE INTERMEDIATE STATE)
5306
p=p+1
(WRAP AROUND WITH NUMBER OF PARTITIONS)

FIG. 6

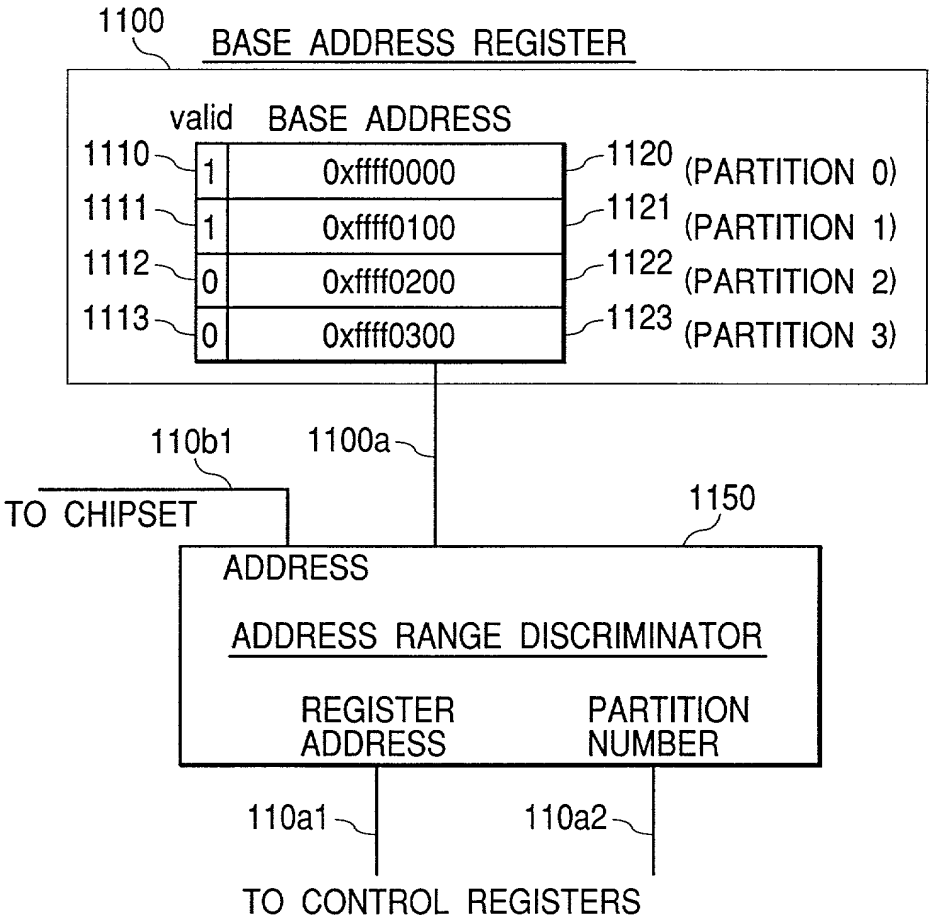

1100
BASE ADDRESS REGISTER
valid
BASE ADDRESS
1110
1
0xffff0000
1120
(PARTITION 0)
1111
1
0xffff0100
1121
(PARTITION 1)
1112
0
0xffff0200
1122
(PARTITION 2)
1113
0
0xffff0300
1123
(PARTITION 3)
110b1
1100a
TO CHIPSET
1150
ADDRESS
ADDRESS RANGE DISCRIMINATOR
REGISTER ADDRESS
PARTITION NUMBER
110a1
110a2
TO CONTROL REGISTERS

FIG. 7

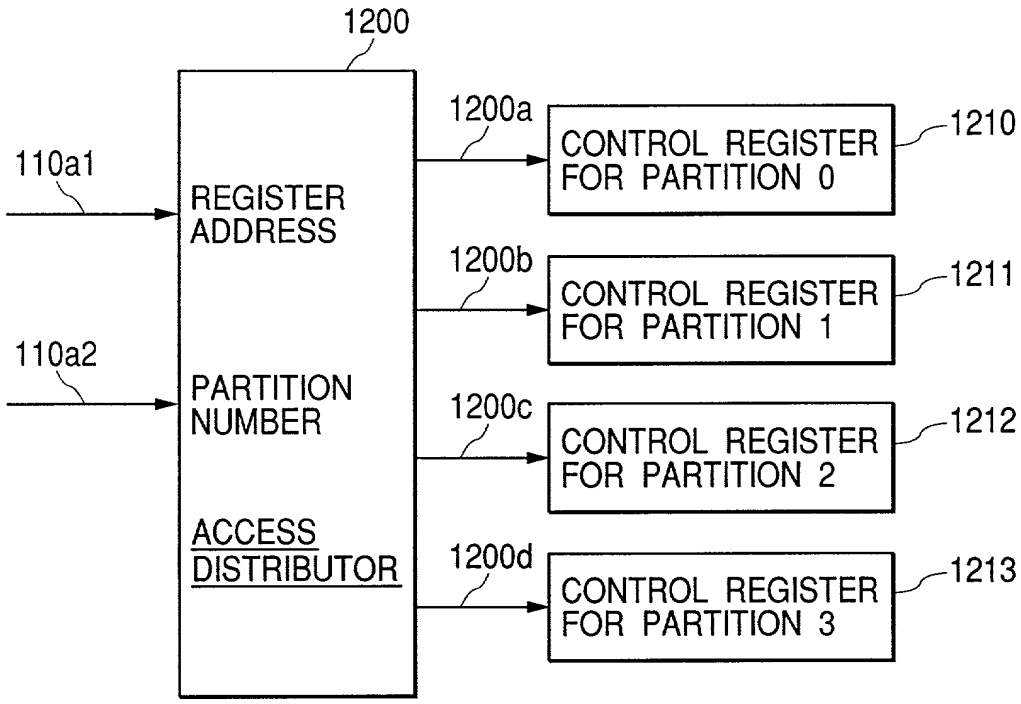

1200
110a1
REGISTER ADDRESS
110a2
PARTITION NUMBER
ACCESS DISTRIBUTOR
1200a
CONTROL REGISTER FOR PARTITION 0
1210
1200b
CONTROL REGISTER FOR PARTITION 1
1211
1200c
CONTROL REGISTER FOR PARTITION 2
1212
1200d
CONTROL REGISTER FOR PARTITION 3
1213

FIG. 8

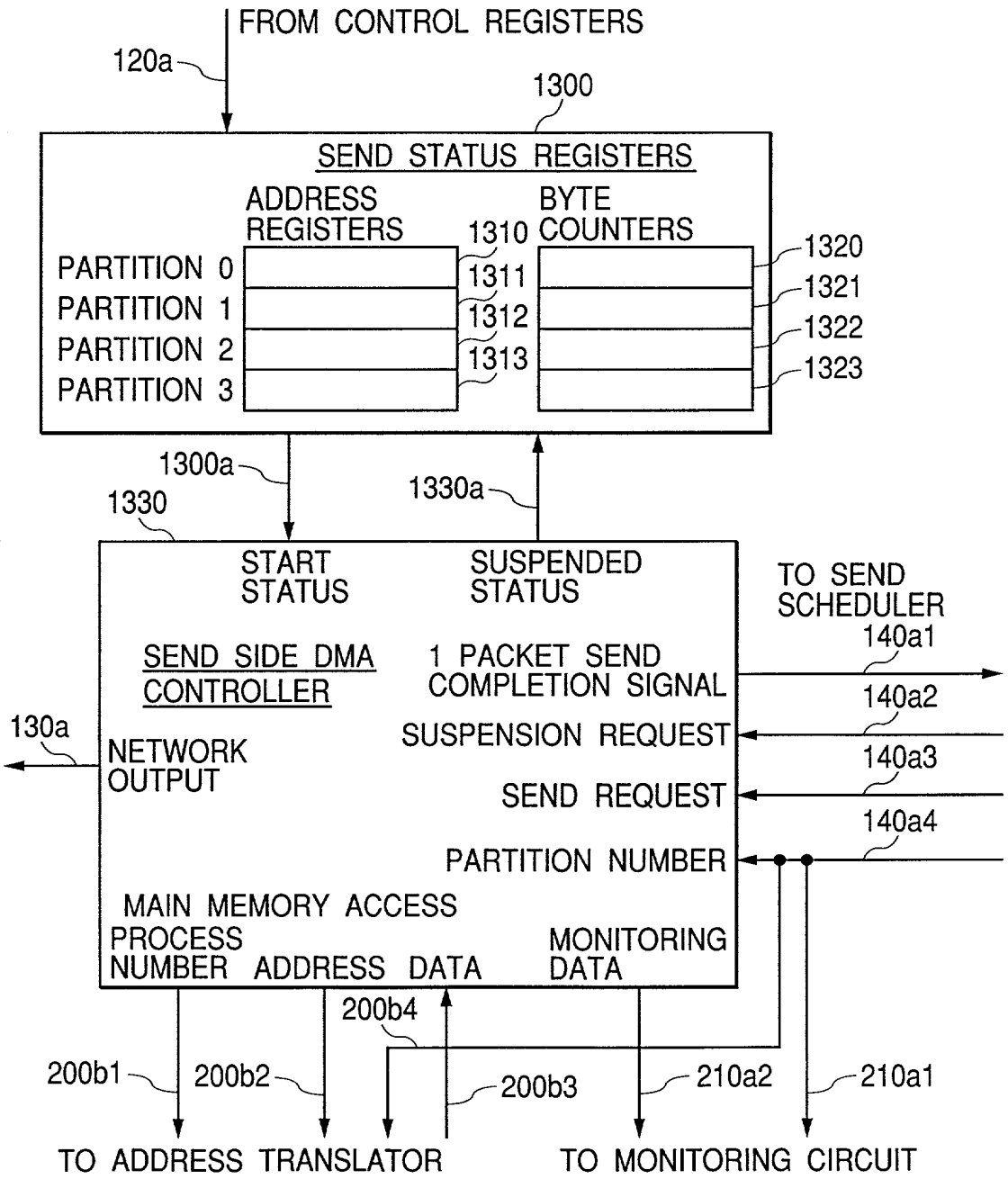

FROM CONTROL REGISTERS
120a
1300
SEND STATUS REGISTERS
ADDRESS REGISTERS
1310
BYTE COUNTERS
PARTITION 0
PARTITION 1
PARTITION 2
PARTITION 3
1311
1312
1313
1320
1321
1322
1323
1300a
1330a
1330
START STATUS
SUSPENDED STATUS
TO SEND SCHEDULER
140a1
SEND SIDE DMA CONTROLLER
1 PACKET SEND COMPLETION SIGNAL
140a2
SUSPENSION REQUEST
130a
NETWORK OUTPUT
140a3
SEND REQUEST
140a4
PARTITION NUMBER
MAIN MEMORY ACCESS PROCESS NUMBER ADDRESS DATA
MONITORING DATA
200b4
200b1
200b2
200b3
210a2
210a1
TO ADDRESS TRANSLATOR
TO MONITORING CIRCUIT

FIG. 9

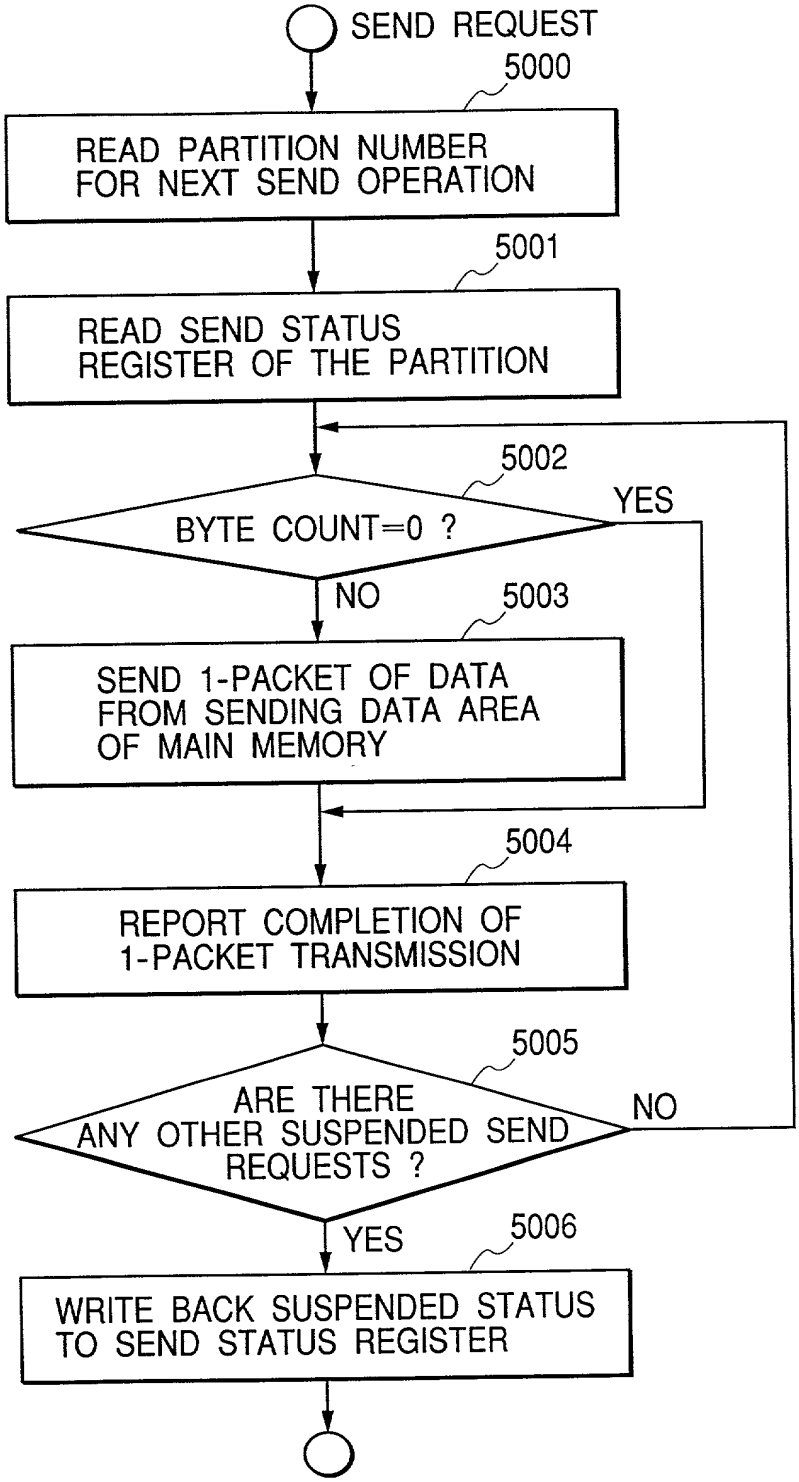

SEND REQUEST
5000
READ PARTITION NUMBER FOR NEXT SEND OPERATION
5001
READ SEND STATUS REGISTER OF THE PARTITION
5002
BYTE COUNT=0 ?
YES
NO
5003
SEND 1-PACKET OF DATA FROM SENDING DATA AREA OF MAIN MEMORY
5004
REPORT COMPLETION OF 1-PACKET TRANSMISSION
5005
ARE THERE ANY OTHER SUSPENDED SEND REQUESTS ?
NO
YES
5006
WRITE BACK SUSPENDED STATUS TO SEND STATUS REGISTER

FIG. 10

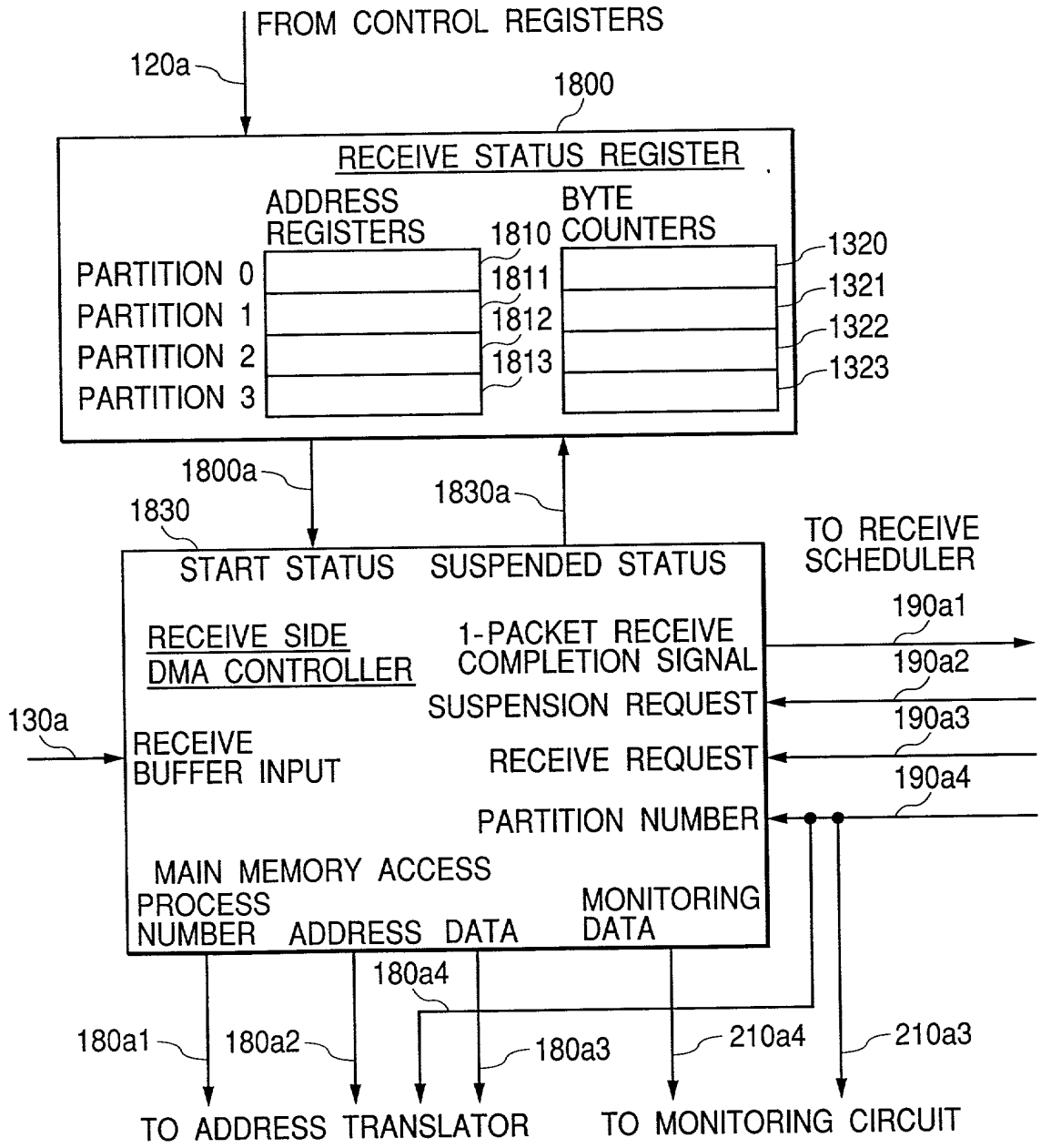

FROM CONTROL REGISTERS
120a
1800
RECEIVE STATUS REGISTER
ADDRESS REGISTERS
1810
BYTE COUNTERS
PARTITION 0
PARTITION 1
PARTITION 2
PARTITION 3
1811
1812
1813
1320
1321
1322
1323
1800a
1830a
1830
TO RECEIVE SCHEDULER
START STATUS
SUSPENDED STATUS
190a1
RECEIVE SIDE DMA CONTROLLER
1-PACKET RECEIVE COMPLETION SIGNAL
190a2
SUSPENSION REQUEST
130a
190a3
RECEIVE BUFFER INPUT
RECEIVE REQUEST
190a4
PARTITION NUMBER
MAIN MEMORY ACCESS PROCESS NUMBER
ADDRESS DATA
MONITORING DATA
180a4
180a1
180a2
180a3
210a4
210a3
TO ADDRESS TRANSLATOR
TO MONITORING CIRCUIT

FIG. 11

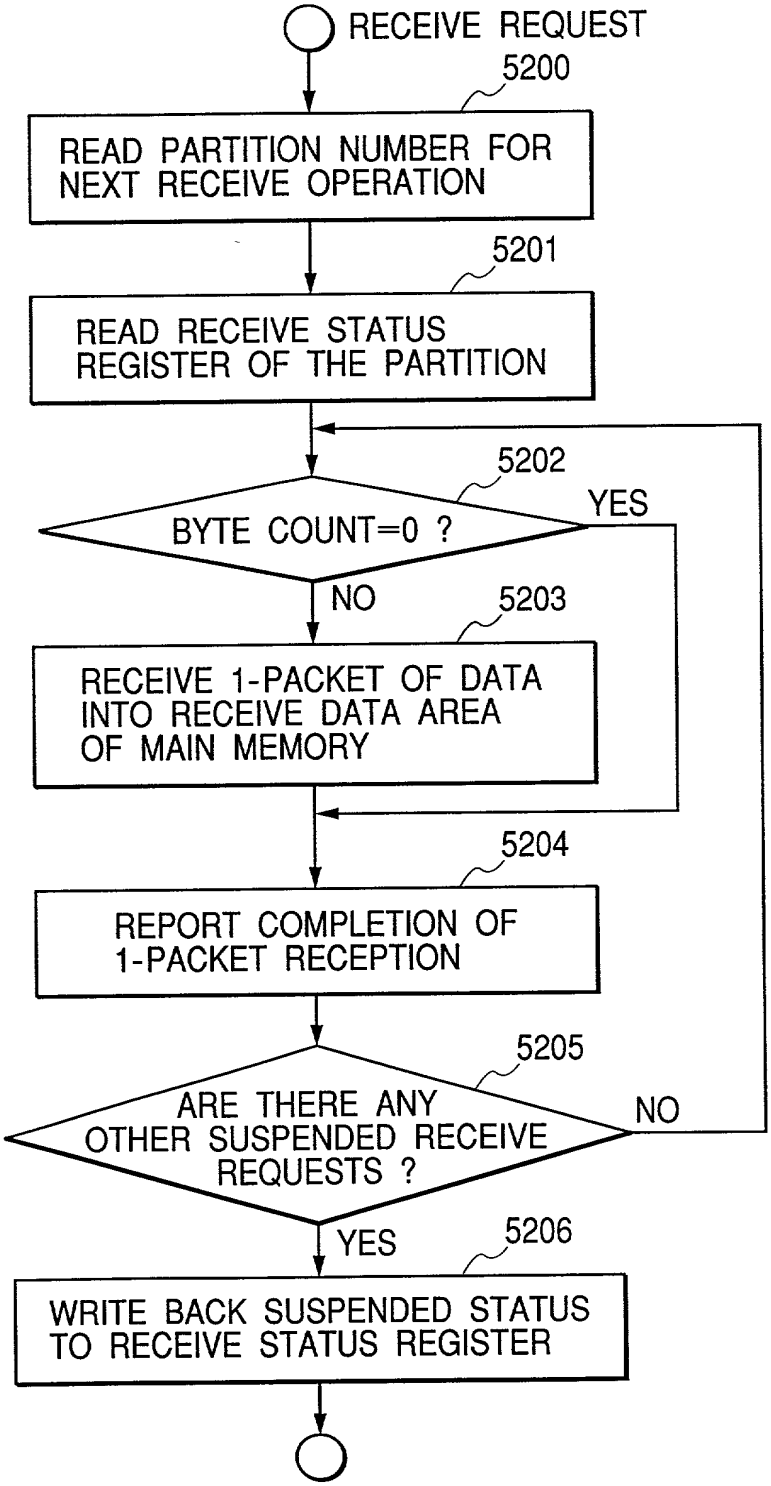

RECEIVE REQUEST
5200
READ PARTITION NUMBER FOR NEXT RECEIVE OPERATION
5201
READ RECEIVE STATUS REGISTER OF THE PARTITION
5202
BYTE COUNT=0 ?
YES
NO
5203
RECEIVE 1-PACKET OF DATA INTO RECEIVE DATA AREA OF MAIN MEMORY
5204
REPORT COMPLETION OF 1-PACKET RECEPTION
5205
ARE THERE ANY OTHER SUSPENDED RECEIVE REQUESTS ?
NO
YES
5206
WRITE BACK SUSPENDED STATUS TO RECEIVE STATUS REGISTER

FIG. 12

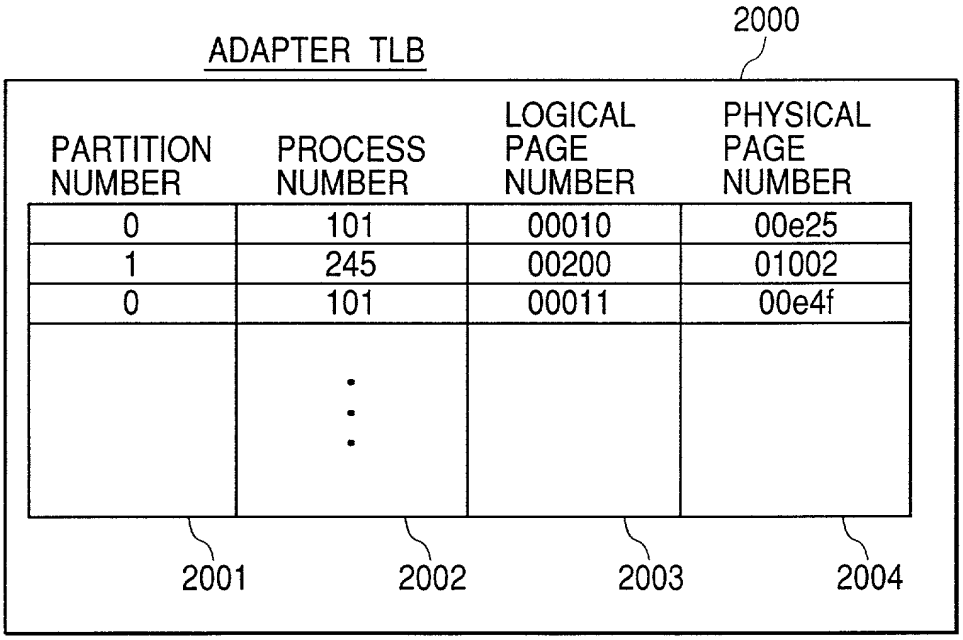

2000
ADAPTER TLB
PARTITION NUMBER
PROCESS NUMBER
LOGICAL PAGE NUMBER
PHYSICAL PAGE NUMBER
0
101
00010
00e25
1
245
00200
01002
0
101
00011
00e4f
2001
2002
2003
2004

FIG. 13

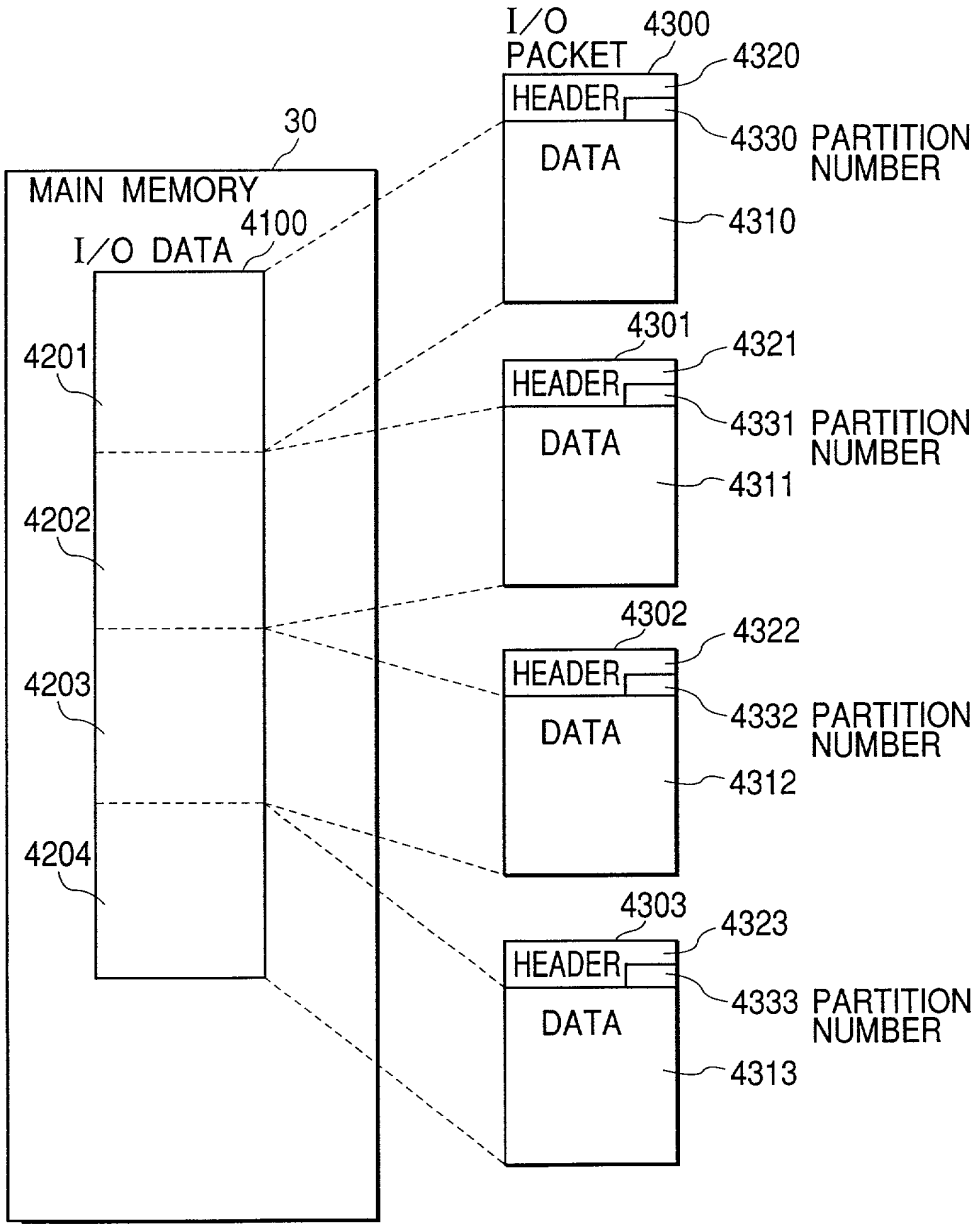

I/O PACKET
4300
4320
HEADER
4330 PARTITION NUMBER
DATA
4310
30
MAIN MEMORY
4100
I/O DATA
4201
4301
4321
HEADER
4331 PARTITION NUMBER
DATA
4311
4202
4302
4322
HEADER
4332 PARTITION NUMBER
DATA
4312
4203
4204
4303
4323
HEADER
4333 PARTITION NUMBER
DATA
4313

FIG. 14

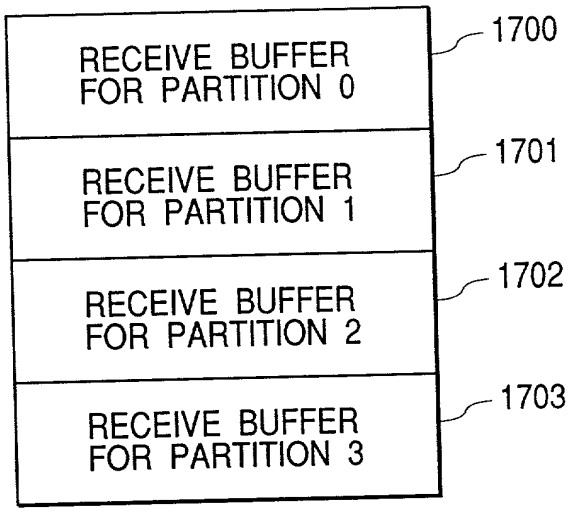

RECEIVE BUFFER FOR PARTITION 0
1700
RECEIVE BUFFER FOR PARTITION 1
1701
RECEIVE BUFFER FOR PARTITION 2
1702
RECEIVE BUFFER FOR PARTITION 3
1703

FIG. 15

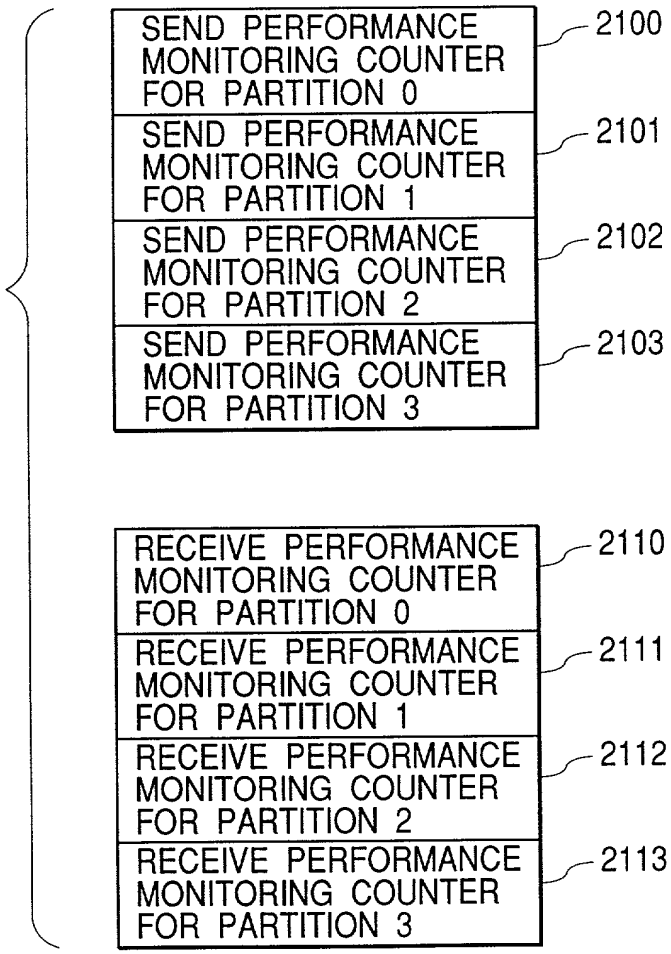

SEND PERFORMANCE MONITORING COUNTER FOR PARTITION 0
2100
SEND PERFORMANCE MONITORING COUNTER FOR PARTITION 1
2101
SEND PERFORMANCE MONITORING COUNTER FOR PARTITION 2
2102
SEND PERFORMANCE MONITORING COUNTER FOR PARTITION 3
2103
RECEIVE PERFORMANCE MONITORING COUNTER FOR PARTITION 0
2110
RECEIVE PERFORMANCE MONITORING COUNTER FOR PARTITION 1
2111
RECEIVE PERFORMANCE MONITORING COUNTER FOR PARTITION 2
2112
RECEIVE PERFORMANCE MONITORING COUNTER FOR PARTITION 3
2113

FIG. 16

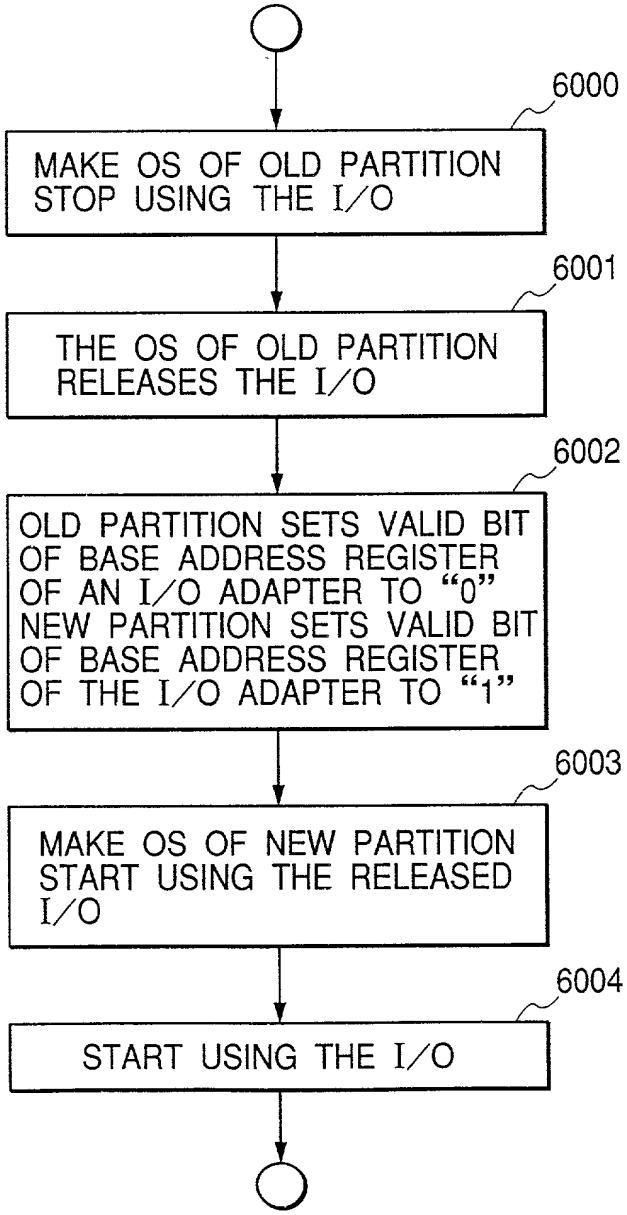

6000
MAKE OS OF OLD PARTITION STOP USING THE I/O
6001
THE OS OF OLD PARTITION RELEASES THE I/O
6002
OLD PARTITION SETS VALID BIT OF BASE ADDRESS REGISTER OF AN I/O ADAPTER TO "0" NEW PARTITION SETS VALID BIT OF BASE ADDRESS REGISTER OF THE I/O ADAPTER TO "1"
6003
MAKE OS OF NEW PARTITION START USING THE RELEASED I/O
6004
START USING THE I/O

FIG. 17

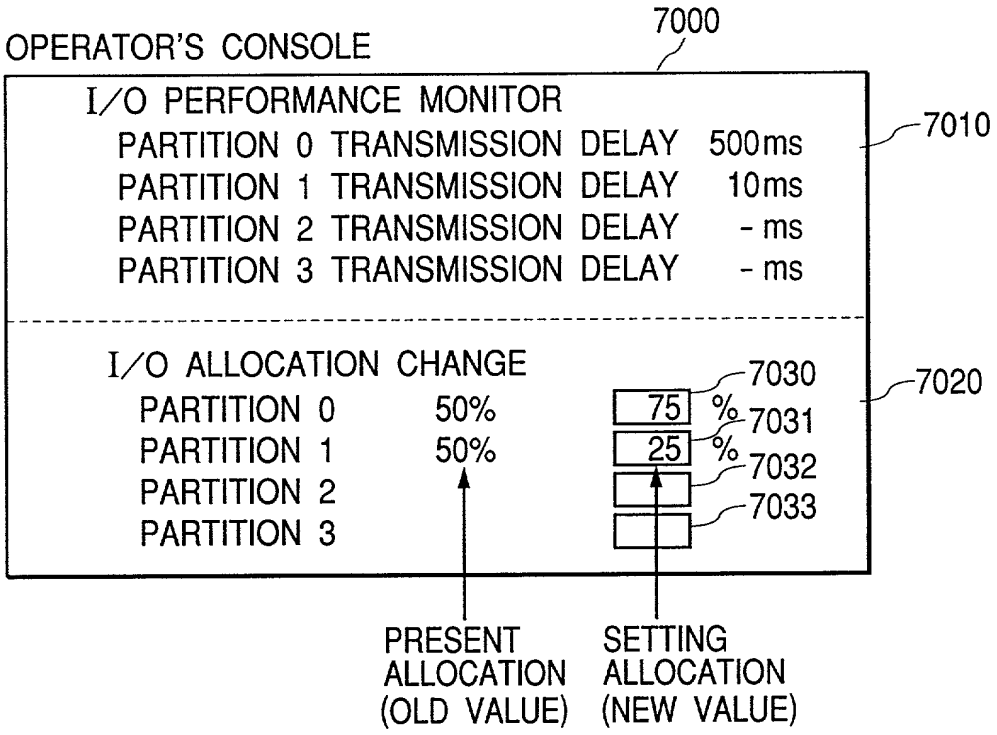


FIG. 18

CONFIGURATION FILE 7050

I/O ALLOCATION

TIME OF DAY	PARTITION 0	PARTITION 1	PARTITION 2	PARTITION 3
8:00	50%	50%	0%	0%
18:00	75%	25%	0%	0%

FIG. 19

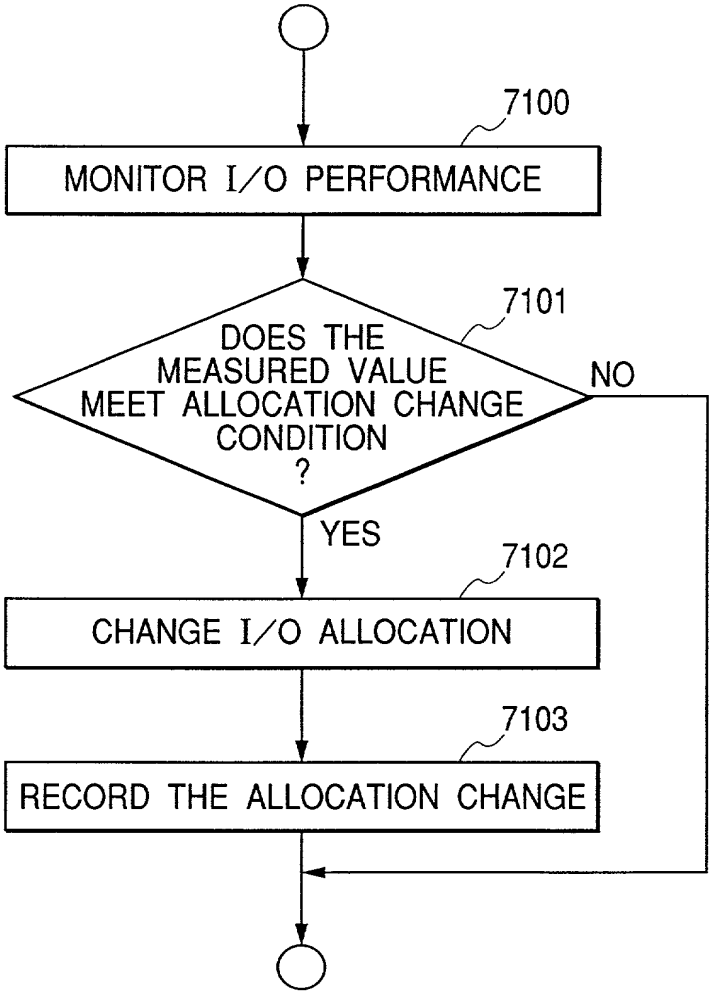
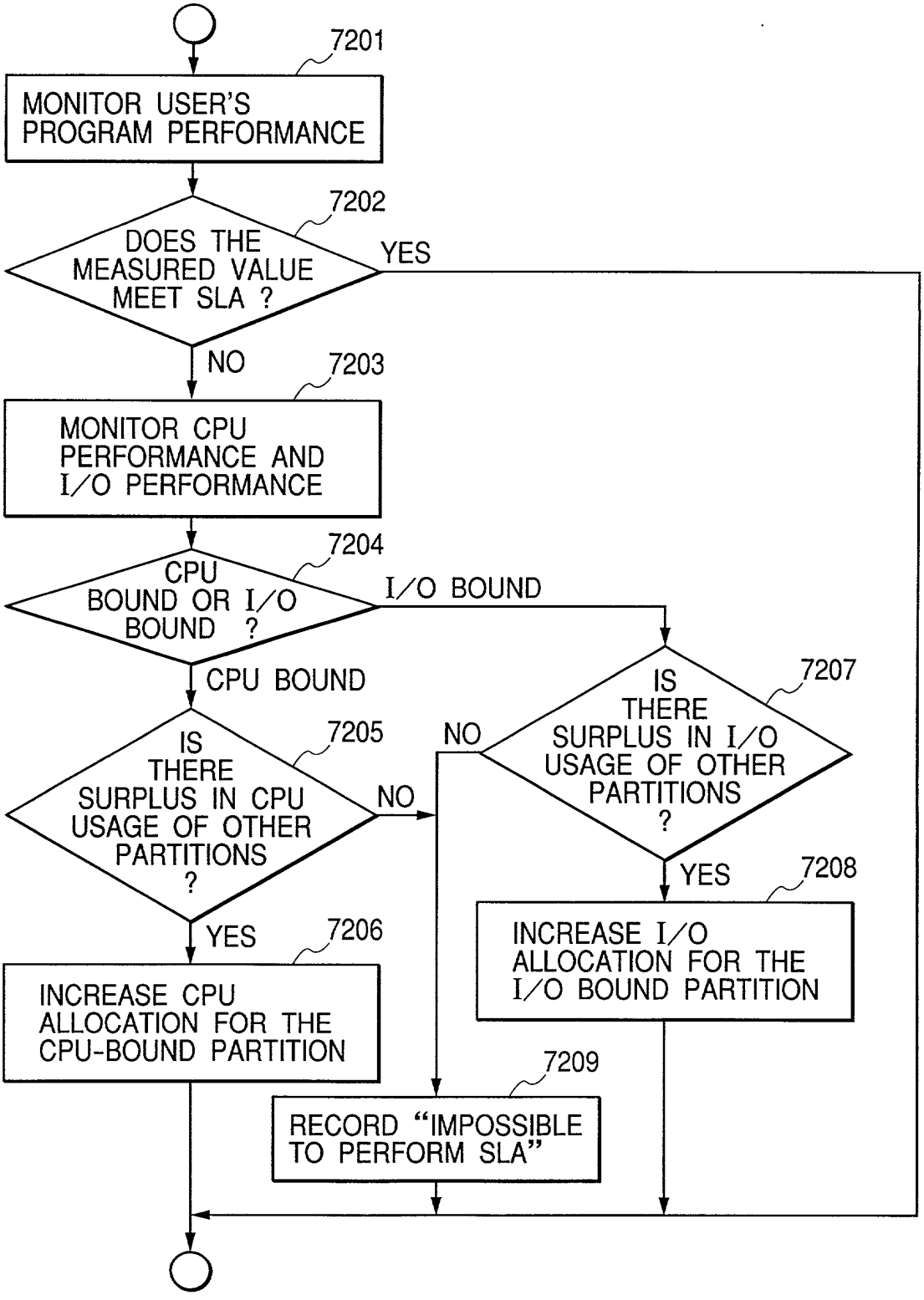

7100
MONITOR I/O PERFORMANCE
7101
DOES THE MEASURED VALUE MEET ALLOCATION CHANGE CONDITION ?
NO
YES
7102
CHANGE I/O ALLOCATION
7103
RECORD THE ALLOCATION CHANGE

FIG. 20


7201
MONITOR USER'S PROGRAM PERFORMANCE
7202
DOES THE MEASURED VALUE MEET SLA ?
YES
NO
7203
MONITOR CPU PERFORMANCE AND I/O PERFORMANCE
7204
CPU BOUND OR I/O BOUND ?
I/O BOUND
CPU BOUND
7205
IS THERE SURPLUS IN CPU USAGE OF OTHER PARTITIONS ?
NO
YES
7206
INCREASE CPU ALLOCATION FOR THE CPU-BOUND PARTITION
7207
IS THERE SURPLUS IN I/O USAGE OF OTHER PARTITIONS ?
NO
YES
7208
INCREASE I/O ALLOCATION FOR THE I/O BOUND PARTITION
7209
RECORD "IMPOSSIBLE TO PERFORM SLA"